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PROJECT NO. 52373

REVIEW OF WHOLESALE
ELECTRIC MARKET DESIGN

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PUBLIC UTILITY COMMISSION
OF TEXAS

COMMENTS OF
AMERICAN COUNCIL FOR AN ENERGY EFFICIENT ECONOMY

Comes now the American Council for an Energy-Efficient Economy (ACEEE) and files these Comments in response to the Commission Staff's memo from September 20, 2021 requesting that proposals on market design recommendations be filed in this proceeding. ACEEE is a nonprofit research organization based in Washington, D.C. that conducts research and analysis on energy efficiency, and is one of the leading groups working on energy efficiency issues in the United States at the national, state, and local levels. We previously submitted comments in response to questions on demand response on September 9, 2021.

Introduction

Texas faces electric reliability problems as illustrated by large load shedding during winter storm Uri in February 2021. It also faces summer supply challenges as illustrated by the calls for conservation in June 2021, which were driven by a large number of plants out of service for unplanned repairs. Numerous solutions have been proposed to address these problems, including subsidized winterization of existing power plants and critical grid infrastructure, and construction of many new power plants (for instance, there are now two proposals to spend \$8 billion on a fleet of new gas-fired power plants to be used only in emergency conditions but charged to all ERCOT electric customers). An alternative way to address these problems is to expand Texas' very limited set of energy efficiency and demand response programs, with a focus on programs that can substantially reduce summer and winter peak demand.

Energy efficiency (EE) programs deliver ongoing reductions in energy use while providing the same or improved level of function. Demand response (DR) programs modify when electricity is consumed in response to price signals or specific calls from the grid operator. In combination, EE and DR can make important contributions to grid reliability in Texas — including during both summer and winter peak periods — by delivering critical services to customers while reducing generation and

delivery costs. Texas' growing population and economy may require additional generation in the future, but realizing the near-term potential of EE and DR can reduce that need significantly.

Preliminary Analysis: Demand-Side Options to Address Texas' Reliability Challenges

The purpose of these comments is to inform the Public Utility Commission of Texas (PUCT) on the extent of cost-effective energy and demand savings ERCOT could feasibly procure through EE and DR over a 5-year period. We provide estimates of the utility economics of a set of seven key demand-side programs (via simple benefit-cost ratios from the utility perspective), and estimate the resulting annual electricity and seasonal (i.e., winter/summer) peak demand reductions each year through 2027. This analysis focuses exclusively on the residential sector, which accounts for 51% and 49% of winter- and summer-temperature-sensitive peak loads, respectively¹. We note that Texas IOUs already support many of these measures via the Residential Standard Offer Program, though at a far lower level than our analysis recommends (primarily, it appears, due to the small size of current budgets.) These comments constitute a preliminary summary of a white paper that ACEEE will finalize in advance of the October 14 workshop, and which will contain additional methodological and calculation details.

We investigated seven potential utility programs that can have large peak demand impacts:

1. Electric furnace replacement program (with Energy Star heat pumps)
2. Attic insulation and sealing incentive program
3. Smart thermostat incentive program
4. Central air conditioner demand response program (with smart thermostat control)
5. Electric vehicle managed charging program
6. Heat pump water heaters incentive program
7. Water heater demand response program

We also quantify the impact on Texas electric demand of a federal standard that will phase out incandescent lamps; Texas utilities and ERCOT should factor this into their load planning but do not need to do anything to achieve these savings.

¹ Herbert, C. 2018. IOU Energy Efficiency Programs Collaborative. Austin, TX: SPEER. www.puc.texas.gov/industry/projects/electric/38578/SPEER_EEIP-102018.pdf. More recent (2019) values sourced from ERCOT presentation without clear citation are 51% and 48% residential demand load for winter and summer respectively.

Overall, with these seven programs, we found that after five years, winter peaks in Texas could be reduced by about 11,400 MW and summer peaks by about 7,650 MW (see Figure 1). This matches the total generation capacity of nearly ten new gas-fired combined-cycle power plants of 800 MW each. These programs will also reduce annual electricity consumption by about 7,000 million kWh. This is equivalent to the annual energy draw of about 580,000 Texas households—more than the number of households in all of Dallas.²

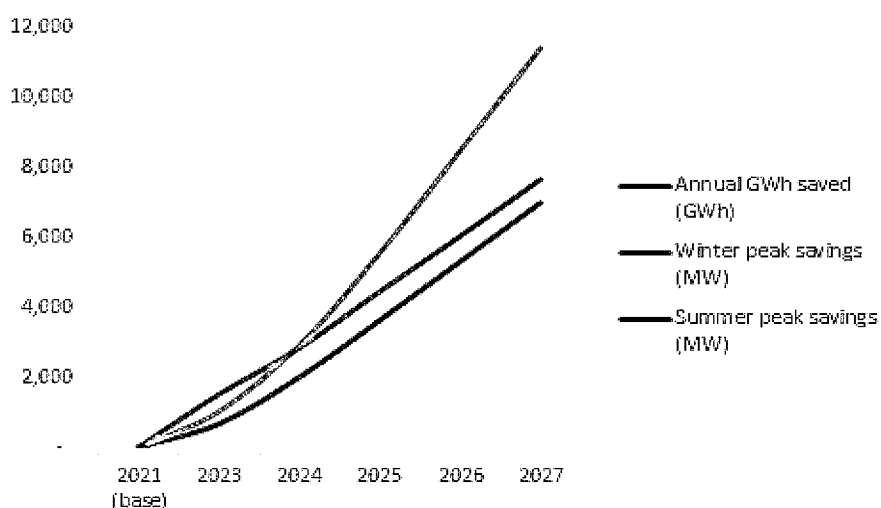


Figure 1. Annual energy and peak savings by year from the sum of the seven programs analyzed.

Preliminary results are summarized by program in Table 1. The largest winter peak reductions are from replacing electric furnaces with heat pumps. The largest summer peak reductions are from central air conditioner demand response. The attic insulation and sealing program has the largest energy (kWh) savings while the smart thermostat program has the best benefit-cost ratio. The attic insulation and sealing program will improve resident comfort in addition to the energy and peak savings produced; this program accounts for about 60% of the total cost of the analyzed measures.

The proposed programs will cost about \$700 million in the first full year and about \$1 billion per year in years two through five. We recommend that 2022 be used for program planning and launch, with 2023 being the first full year of expanded programs. For 2022 we recommend that present energy efficiency and demand response budgets be doubled from the \$140 million budgeted in 2021 to about \$280 million in 2022. Budgets should be about doubled again in 2023 and 2024, and then level

² U.S. Census Bureau. 2021. "Quick Facts: Dallas city, Texas". Washington, DC: USCB. www.census.gov/quickfacts/dallascitytexas

after that. While these costs are substantial, new power plants will cost even more in capital costs, with additional costs of fuel and maintenance that must be paid each year. For the energy efficiency and demand response programs we modeled, annual operating costs to the utilities are included in the \$1 billion/year budget. Over the life of these measures, the average cost of these energy savings is about \$0.056/kWh, which is less than half the \$0.12/kWh average residential electric rate in Texas. The benefit-cost ratios (BCR) of electric furnace replacement, attic insulation and sealing, and heat pump water heater programs are 2.3, 2.7, and 2.9, respectively. The smart thermostat program has a BCR of more than 12, while the DR programs have BCRs all between 1 and 2.

Table 1. Five-Year Savings from 7 Residential Energy Efficiency and Demand Response Programs Targeting Peak Demand Reductions

Program	Peak Savings in Year 5 (MW)		Energy Savings Over 5 Years (GWh)	5-Year Costs (\$million)
	Summer	Winter		
Efficiency				
Replacement of electric furnaces with Energy Star HP	125	6,130	774	571
Attic insulation/sealing and duct sealing	1,725	2,079	4,146	3,127
Smart Thermostats	995	12,225	1,831	152
Heat pump water heaters	37	41	259	59
Subtotal	2,882	10,476	7,008	\$3,968
Demand Response				
Central AC demand response	3,010	-		587
Water heater demand response	876	876		202
EV charging demand response	896	52		120
Subtotal	4,781	940		909
TOTAL	7,664	11,416		\$4,877
Add 16% reserve margin	8,990	13,242		

These savings are for all of Texas and include investor-owned utilities, large municipal utilities (Austin Energy and CPS Energy, both of which are already implementing many of these programs, and smaller coops and municipal utilities. The allowance at the bottom for reserve margin reflects the impact of reduced demand on needed generating capacity. ERCOT estimated a 16% reserve margin for summer 2021³ and we use this figure for our calculation.

³ ERCOT. 2021. *Record electric demand expected this summer*. May 6. www.ercot.com/news/releases/show/230649

Our analysis is a preliminary and simplified one to inform this proceeding, and additional analysis is needed. ACEEE is prepared to conduct a more detailed study, looking more fully at programs costs, load shape impacts, rate impacts, and employment impacts. The bottom line is that the energy efficiency and load management programs we have examined have large benefits to Texas consumers and utilities. Consumers will benefit from:

- Enhanced grid reliability (due to reductions in peak demand in summer and winter and improved grid flexibility from expanded demand response tools);
- Lower energy bills (due to reduced consumption and reduced need for utility capital expenditures); and
- Improved comfort and health (insulation and sealing will make homes more comfortable, and able to retain temperatures better during power outages)

Utilities will benefit from reduced capital needs (as lower demand will reduce the need for transmission and distribution investments), and from a more reliable grid that is less vulnerable to extreme weather.

Implications for Utilities

We recommend that Texas utilities begin planning for new or expanded programs like the following seven included in our analysis, which have large peak demand savings and appear to be cost-effective to the utility:

1. Electric furnace replacement program (with Energy Star heat pumps)
2. Attic insulation and sealing incentive program
3. Smart thermostat incentive program
4. Central air conditioner demand response program (with smart thermostat control)
5. Electric vehicle managed charging program
6. Heat pump water heaters incentive program
7. Water heater demand response program

Additionally, utilities should factor the energy savings from the federal incandescent lamp phaseout into their load forecasts (this is essentially a free program).

However, expanding these programs will require market design changes and regulatory certainty, which the Commission can foster through the recommended actions below. Despite an early

start in the early 2000s, Texas is now far behind other states in deploying energy efficiency and demand response to manage demand, support customers, and reduce the likelihood and potential damage from future summer and winter extreme weather events. In ACEEE's 2020 State Energy Efficiency Scorecard, Texas ranked 38th among the 50 states in energy efficiency savings as a percent of electric consumption, and 36th in energy efficiency spending as a percent of electric utility revenues.⁴

Market Design Recommendations

We offer the following four recommendations to take advantage of Texas' demand-side potential: 1) direct utilities to consider the six high-value programs listed above, 2) reform the state's energy efficiency resource standard (EERS) and raise goals to encourage higher levels of peak demand and energy savings, while giving utilities flexibility in meeting those requirements, 3) set utility demand response goals, and 4) set market rules for compensation and aggregation to enable residential demand response.

Direct utilities to consider high value programs: The PUCT should direct utilities to assess their capacity to develop or scale the seven EE and DR programs listed above to the levels indicated in Table 1. Taken together, these programs will cost less than the \$8 billion that has been proposed for new power plants, while curtailing the need for roughly equivalent amounts of summer peak power and even greater winter peak power. Conditionalized on those results, the PUCT should institute through a rule change an increase in the Energy Efficiency Cost Recovery Factors to provide financial support for the utilities to deliver those measures to customers.

Reform EERS: EERS policies have proven themselves to be the most effective way for a state to guarantee long-term energy savings. In 2017, states with an EERS in effect achieved incremental electricity savings of 1.2% of retail sales on average.⁵ While leading states have been able to realize cost-effective savings of 1.5%-2.5% of sales annually, Texas has lagged significantly. Despite being the first state to adopt an EERS in 1999, Texas has since been leapfrogged by 26 other states, and now has the weakest EERS in the country with a target of 0.2% of sales, which is even less than the average realized

⁴ Berg, W., S. Vaidyanathan, B. Jennings, E. Cooper, C. Perry, M. DiMascio, and J. Singletary. 2020. *The 2020 State Energy Efficiency Scorecard*. Washington, DC: American Council for an Energy-Efficient Economy. www.aceee.org/research-report/u2011.

⁵ Gold, R., L. Ungar and W. Berg. 2021. *An Energy Efficiency and Clean Electricity Standard: Managing Demand Is Key to a Cheaper and More Equitable Carbon-Free Electric Grid*. www.aceee.org/sites/default/files/pdfs/d10.1_eecs_policy_brief_updated_8-27-21.pdf

savings of states *without* such targets (0.3%). Figure 2 shows the ambition of Texas' EERS for transmission and delivery utilities (TDUs) compared to all other states with such a policy.

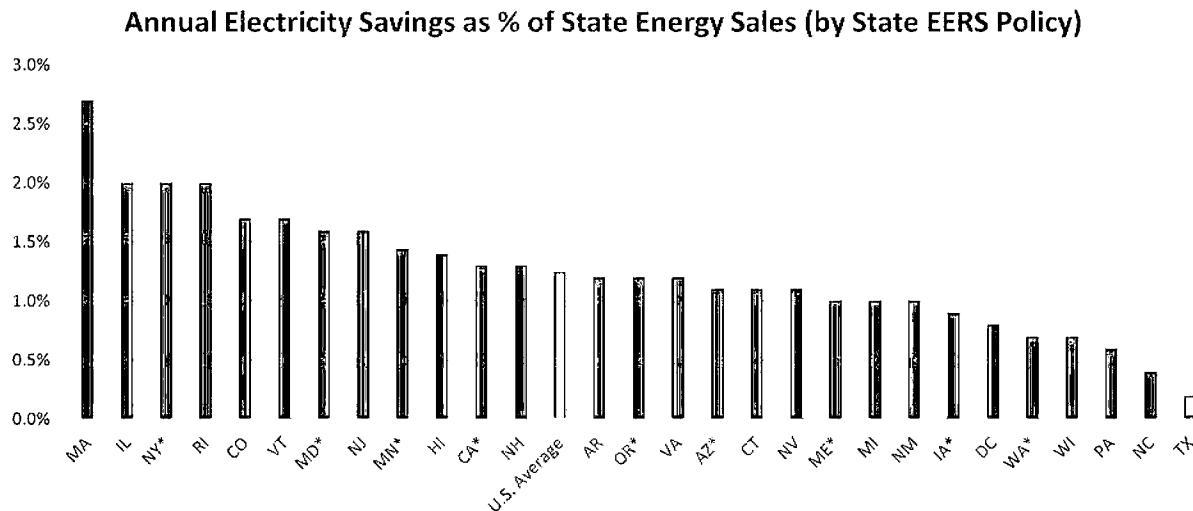


Figure 2. Annual electricity savings as a percent of state energy sales per state EERS policies. For comparison, ACEEE estimated an average annual savings target by calculating each state's EERS savings over the years specified in the EERS policy. *State savings reported on a gross basis. Net adjustment applied to compare with states reporting net savings.⁶

The PUCT can utilize its existing authority to increase energy efficiency program funding. Research from the National Renewable Energy Laboratory (NREL) and Electric Power Research Institute (EPRI) demonstrate the potential for savings beyond 1% per year in Texas.⁷ Given the enormous potential of demand-side resources, we advise increasing the EERS to at least 1% retail sales annually. Energy efficiency measures pursued under this elevated standard should target both summer and winter savings, particularly those that are coincident with peak and can deliver reliability benefits.

Set utility demand response goals: We recommend the PUCT set a demand response goal for TDUs and, if feasible, other load serving entities in the state including NOIEs and REPs, to complement the increased EERS recommended above. Energy efficiency and demand response can work hand-in-hand

⁶ Data: Gold, R., L. Ungar and W. Berg. 2021. *An Energy Efficiency and Clean Electricity Standard: Managing Demand Is Key to a Cheaper and More Equitable Carbon-Free Electric Grid*. www.aceee.org/sites/default/files/pdfs/d10.1_eeces_policy_brief_updated_8-27-21.pdf

⁷ NREL (National Renewable Energy Laboratory). 2017. *Texas Residential Energy Efficiency Potential*. <https://www.nrel.gov/docs/fy18osti/68838.pdf>

EPRI (Electric Power Research Institute). 2017. *State-Level Electric Energy Efficiency Potential Estimates*. www.epri.com/#/pages/product/000000003002009988/

to improve the reliability and flexibility of Texas' power system at a lower cost to utilities and customers. ACEEE's preliminary analysis supports a demand response goal of about 10% of projected summer and winter peak load by 2027, even though our analysis does not include commercial and industrial demand response; deeper analysis of potential DR resources across all sectors can guide future adjustments to strengthen this goal as warranted.

A demand response goal is needed to increase DR offerings for Texas customers, particularly in the residential sector where much of the potential for DR has yet to be realized. Price signals have not spurred Retail Electric Providers (REPs) to offer robust DR programs to residential customers. As the Public Interest Groups note in their Sep. 9th comments,⁸ less than 2% of REP residential customers are enrolled in DR programs—far fewer than the 12% of Texas municipal and co-op residential customers participating in DR programs. A DR goal could help close this gap. Growth in residential DR in Texas and around the country has led to common standards for automation technologies and protocols for communications and dispatch. The PUCT should adopt clear guidance for TDUs and load-serving entities to incorporate these standards and protocols, which will facilitate program rollout, reduce costs, and improve customer acceptance and satisfaction with the programs offered.⁹

Set market rules for compensation and aggregation to enable residential demand response: Large commercial and industrial customers have been the focus of DR efforts in Texas, but the significant demand response potential in the residential sector has been neglected. As our analysis shows, residential customers can provide substantial demand response resources, and should have the opportunity to benefit from participation in demand response programs. In order for residential demand response to succeed, programs must be tailored to the specific needs of residential customers and the DR opportunity they present; associated regulatory barriers must be addressed.

The PUCT should expand the definition of demand response to include the broad range of reliability, flexibility, and load management services that demand response can deliver, rather than continuing to focus solely on summer peaks. Residential customers can provide valuable winter peak

⁸ Public Interest Groups. 2021. September 9 Comment Letter on Review of Wholesale Electric Market Design (Project 52373). Public Utility Commission of Texas Interchange Filing Search. interchange.puc.texas.gov/Documents/52373_120_1152573.PDF

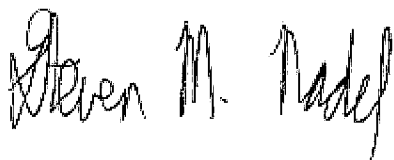
⁹ Snell, E. and C. Valentine. 2020. "Making the Smart Home Work for You: Wrangling Energy and Demand Benefits Out of Connected Tech." In *Proceedings of the 2020 ACEEE Summer Study on Energy Efficiency in Buildings*. Washington, DC: ACEEE. www.esource.com/system/files/esource-aceee-making-the-smart-home-work-for-you.pdf

reductions by reducing load or shifting load to off-peak hours, as well as energy storage during periods of excess capacity (e.g., using water heaters and EV batteries). Effective implementation of expanded demand response capabilities will require clear market rules regarding compensation and aggregation. Residential customers should be offered compensation adequate to encourage their ongoing participation, make up for any inconvenience associated with each demand response event, and demonstrate the value of the resource they are providing. Rules must also be revised to better enable third-party aggregators to market these programs, and to facilitate participation of a large number of customers.

Conclusion

Texas is now at a crossroad. The state can continue on the path that led to the power curtailments in February 2021, and in a more limited way, June 2021 – or it can diversify its portfolio by tapping underutilized energy efficiency and demand response resources, saving money and improving reliability for all Texans. ACEEE appreciates the opportunity to provide these Comments and looks forward to working with the Commission and other interested parties on these issues.

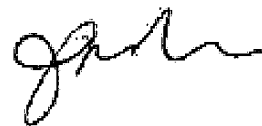
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EXECUTIVE SUMMARY
COMMENTS OF
AMERICAN COUNCIL FOR AN ENERGY EFFICIENT ECONOMY

- Residential energy efficiency (EE) and demand response (DR) measures are currently significantly underutilized in Texas; these tools can be leveraged by utilities to cost-effectively meet summer and winter reliability challenges.
- Statewide deployment of EE measures involving replacement of electric furnaces with ENERGY STAR heat pumps, attic insulation/sealing and duct sealing, smart thermostats, and heat pump water heaters can deliver over 7000 GWh of energy savings over a 5-year period, as well as about 2,900 MW and 10,500 MW of summer and winter peak savings, respectively, by 2027.
- Central air conditioner demand response, water heater demand response, and managed electric vehicle charging can deliver about 4,800 MW and 900 MW of summer and winter peak savings, respectively, by 2027.
- We recommend that 2022 be used for program planning and launch, funded at about twice the level of the 2021 program budget of \$140 million. Programs will then ramp up in 2023 at a cost of about \$700 million in the first full year, and about \$1 billion per year in full-scale program years 2 through 5. Our preliminary analysis shows the average cost of the energy savings of the above measures is about \$0.056/kWh, which is less than half the \$0.12/kWh average residential electric rate in Texas.
- The EE and DR measures above will additionally lower customer energy bills, improve occupant comfort and safety, improve customer resilience to outages, and yield improved power reliability for the grid.
- We advise the PUCT to additionally increase Texas' existing EERS to at least 1% retail sales, set a complementary demand response goal for TDUs and REPs, set market rules for compensation and aggregation to enable residential demand response, and direct utilities to consider implementing or expanding programs like the seven we recommend.

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